



U.S. Department
of Transportation

**Federal Aviation
Administration**

Office of Airport Safety and Standards
Engineering and Specifications Division

800 Independence Ave., SW
Washington, DC 20591

APR 20, 2000

Industry representative:

Enclosed for your review and comment is a draft copy of proposed change 16 to Advisory Circular (AC) 150/5370-10A Standards for Specifying Construction of Airports. The change is as follows:

1. ITEM P-629, COAL-TAR SEALER/REJUVENATOR has been added. The purpose of this material is to seal the pavement from oxidation, to provide a fuel resistant surface (if required), to rejuvenate the asphalt binder and;
2. This specification is intended to replace Engineering Brief #44 for all eligible uses of these products.

Comments received no later than July 1 will be considered for inclusion in the final advisory circular.

Sincerely,

John L. Rice
Manager, Engineering and
Specifications Division

Enclosure



U.S. Department
of Transportation
**Federal Aviation
Administration**

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Advisory Circular

Subject: Change 16 to STANDARDS FOR
SPECIFYING CONSTRUCTION OF
AIRPORTS

Date:
Initiated by: AAS-200

AC No: 150/5370-10A
Change: **DRAFT**

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3 **1. PURPOSE.** ITEM P-629, COAL-TAR SEALER/REJUVENATOR has been added. The purpose of
4 this material is to seal the pavement from oxidation, to provide a fuel resistant surface (if required), and to
5 rejuvenate the asphalt binder.

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7 **2. PRINCIPAL CHANGES.** This is a new Item, P-629.

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9 **3. APPLICATION.** The guidelines contained herein are recommended by the Federal Aviation
10 Administration for asphaltic surfaced pavements in need of sealing, fuel resistance (if required), and
11 rejuvenation of the asphalt binder.

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13 **4. METRIC UNITS.** To promote an orderly transition to metric units, this circular includes both English
14 and metric dimensions. The metric conversions may not be exact equivalents, and until there is an official
15 changeover to metric system, the English dimensions will govern.

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21 DAVID L. BENNETT
22 Director, Office of Airport
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ITEM P-629 COAL-TAR SEALER/REJUVENATOR

DESCRIPTION

629-1.1 This item shall consist of a coal-tar sealer/rejuvenator applied on a prepared bituminous surface, in accordance with these specifications, for the areas shown on the plans or as designated by the Engineer. The purpose of this material is to seal the pavement from oxidation, [to provide a fuel resistant surface] and to rejuvenate the asphalt binder in place.

The most common use of these materials is to rejuvenate older oxidized pavement in place and to seal the surface from further future oxidation. The materials may also be used to provide a fuel resistance surface seal in areas subject to fuel spillage. The formulation of the material may be adjusted to achieve the desired result, i.e., sealing, fuel resistance, or rejuvenation. The surface seal produced may preclude future applications of other rejuvenation formulations.

New surfaces are usually treated to provide fuel resistance and sealing rather than rejuvenation. New surfaces must be sufficiently cured to accept the coal-tar sealer/rejuvenator. A commonly used technique to test for curing is to pour 8 to 12 ounces of water on the surface and observe if any oil appears in the standing water. If oil appears within a few minutes, the surface is not sufficiently cured to accept the material.

MATERIALS

629-2.1 MINIMUM REQUIREMENTS. Coal-tar sealer/rejuvenators shall be capable of sealing the surface of asphaltic concrete pavements, providing a fuel resistant seal, and rejuvenating the asphalt binder without causing a reduction in the friction characteristics of the pavement. Materials must meet the following minimum requirements. The ability of the material to perform these functions, when applied at usual and customary application rates, shall be certified by the Contractor.

a. Coal-Tar Pitch Content. The material must contain a minimum of 35% coal-tar pitch conforming to ASTM D-490, RT-12.

b. Surface Sealing. Surface sealing shall be verified by visual examination indicating the lack of cracking, flaking, peeling, pin holing, or spalling of the material in similar applications.

c. Binder Rejuvenation. The binder rejuvenator component of the material shall be capable of achieving the minimum changes in the asphalt binder properties shown in Table 1. The binder extracted (ASTM D 2172) from samples of the upper 3/8 inch (9 mm) of the surface of the treated pavement shall show the changes in viscosity listed below as compared to untreated samples from the same pavement. The Contractor shall furnish independent laboratory test results verifying the ability of the material to achieve the minimum changes in binder viscosity shown in Table 1.

TABLE 1.

Asphalt Binder Viscosity	Change in Property	Test Method
Viscosity @ 140° F	20% minimum decrease in viscosity within 48 hours and maintain decreased viscosity for at least 2 years	ASTM D-2171 Standard Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer

d. Friction Characteristics. The Contractor shall provide evidence of past performance that the material does not cause a decrease in pavement frictional characteristics in similar applications.

e. Fuel Resistant Seal. The Contractor shall furnish independent laboratory test results demonstrating the material is capable of passing the fuel resistance test described in paragraph 629-3.6, if it is to be further tested for fuel resistance on the project.

TESTING AND APPLICATION RATE

629-3.1 TEST SECTIONS. Prior to full production, the Contractor shall place a series of one-square yard (0.84 square meters) test sections at application rates deemed necessary by the Manufacturer to establish the appropriate project application rates. The areas to be tested will be designated by the Engineer and will be

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located on the existing pavements. One test section shall be required for each different hot-mix asphalt surfacing mixture. The test sections shall be subjected to the following tests and examinations.

The Engineer shall specify the performance requirements based on local conditions and project requirements. Performance shall be based on 24-hour penetration, decreased viscosity, fuel resistance, friction characteristics, effect on grooved pavement, and whether a warranty is required.

a. 24-Hour Penetration. The Engineer shall examine the test sections 24 hours after treatment to determine if all of the sealer/rejuvenator has penetrated into the surface. Application rates which have not allowed full penetration into the pavement surface after 24 hours shall not be permitted to be used for full production.

The Engineer may waive the 24-Hour penetration requirement, particularly if the application will occur when the pavement surface temperature is below 50° F (10° C).

b. Viscosity. The binder extracted (ASTM D 2172) from samples of the upper 3/8 inch (9 mm) of the surface of the treated pavement shall show a decrease of [20%, or as specified by the Engineer] in viscosity from the untreated pavement after 48 hours as measured by ASTM D 2171.

c. Fuel Resistance Test. On all pavement areas where protection from fuel spillage is required, a fuel resistance test as described in Paragraph 629-3.6 shall be conducted on the test section 48 hours after treatment.

d. Runways, taxiways and taxilanes. Applications involving runway, taxiway or taxilane pavements are subject to additional requirements.

(1) Skid Resistance. Pavement skid resistance is related to surface texture, which a coating may affect. The material, applied at an application rate determined in accordance with the requirements of 629-3.1a., 629-3.1b., and 629-3.1c., shall not appreciably affect the texture or lower the skid resistance of the surface of a runway, taxiway or taxilane. Test sections for runways shall be tested for skid resistance using AC 150/5320-12. Tests shall be performed on the test sections and adjacent untreated areas 48 hours after treatment. Taxiways and taxilanes may be tested in accordance with ASTM E303. Material or application rates which lower runway, taxiway or taxilane skid resistance [by more than 15 BPN numbers for taxiways /taxilanes, or to levels judged to be unacceptable by the Engineer] shall not be used.

The Engineer shall determine the frictional characteristics of the existing pavement using the guidance contained in AC 150/5320-12. Sufficient application and comparison test areas shall be designated to properly assess the frictional characteristics. Pavements with marginal or nearly marginal frictional properties may become unacceptable when treated with these materials. The Engineer may require frictional characteristics and tests on other pavement as deemed necessary.

(2) Grooved Surfaces. On grooved runways the material shall not soften the surface to the extent that closing of the grooves will occur when the pavement is subjected to aircraft tire loads. The Engineer shall make a determination as to whether closing of the grooves is likely after the material has cured for at least 48 hours. Material or application rates which, in the judgment of the Engineer, is likely to result in closure of the grooves shall not be used. In no case shall groove deterioration exceed that recommended by AC 150/5320-12.

(3) Porous Friction Course. On runways treated with a porous friction course (PFC) the material shall not degrade the surface treatment to the extent that closing of the porous openings will occur and interfere with the ability of the PFC to shed precipitation. The Engineer shall make a determination as to whether closing of the openings is likely after the material has cured on a test section for at least 48 hours. Material or application rates which, in the judgment of the Engineer, is likely to result in closure of the openings shall not be used

629-3.4 TEST FREQUENCY. One series of binder rejuvenation tests [and one field fuel test] shall be performed for each 150,000 square feet (14 000 square meters) or fractional part of treated pavement. The location of the binder rejuvenation tests [and field fuel test] shall be randomly selected by the Engineer.

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629-3.5 APPLICATION RATE. Application rates shall be determined by the Contractor and approved by the Engineer. The application rate selected shall incorporate the results of testing performed in paragraph 629-3.1 a, b, c, and d.

629-3.6 FIELD FUEL RESISTANCE TEST. This test consists of measuring the fuel resistance capabilities of the coal-tar sealer/rejuvenator after it has been applied to the pavement.

This test procedure does not address all of the environmental and safety problems associated with its use. It is the responsibility of the user to establish appropriate environmental, safety, health, and clean-up practices and determine the applicability of regulatory limitations prior to use.

The test consists of the following steps:

a. Apparatus:

- (1) 6 inch (152 mm) diameter metal tube or pipe 3 inches (76 mm) long or a clear pipe with premarked levels
- (2) Lid for pipe
- (3) 100% silicon rubber sealant or other fuel resistant sealant
- (4) Ruler.

b. Procedure:

- (1) Locate a clean flat surface on the treated pavement.
- (2) Place the pipe on the pavement surface and seal the edge with silicon. Firmly mold the silicon between the pipe and the surface of the pavement to prevent leakage.
- (3) Allow the silicon sealant to cure for 24 hours.
- (4) Pour one inch (25 mm) of 87-octane automotive gasoline inside the pipe and measure the level of the gasoline by placing the ruler inside the pipe and measuring the distance between the top of the pipe and the surface of the gasoline. Cover the pipe with a lid.
- (5) After 30 minutes remove lid and re-measure the level of the gasoline.
- (6) If seepage of gasoline through the silicon rubber sealant/pavement occurs, the test is invalid and a new test must be performed

c. Failure Criteria: If more than 0.2 inches (5 mm) of gasoline penetrates the sealed pavement after 30 minutes, the fuel resistance is not acceptable.

CONSTRUCTION METHODS

629-4.1 SAFETY AND ODOR. These materials must be handled with caution. The Contractor should obtain a Materials Safety Data Sheet (MSDS) for the product and require workmen to closely follow the manufacturer's recommended safety precautions. In some instances, people in proximity to applications of these materials have voiced objections to the odors associated with their use. Odor and the dissipation of odor may be dependent on the amount of material applied, air temperature, relative humidity, wind conditions, and temperature inversions. Every effort should be made to minimize the exposure of the public to the odors associated with the use of these products. Media advisories may be useful in informing and warning the public about odors.

629-4.2 WEATHER LIMITATIONS. The rejuvenator/sealer shall be applied only when the existing surface is dry and the pavement surface temperature is 50° F (10° C) or higher and above the dew point. This temperature minimum should be forecast for at least 6 hours following application.

The Engineer may modify the above weather limitations with agreement from the Contractor and supplier.

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629-4.3 EQUIPMENT. The Contractor shall furnish sufficient safety equipment for personnel as well as all equipment, tools, and machines necessary for the performance of the work. The distributor shall be designed and equipped as follows:

- a. Adequate heating capability for rapid heating of the sealer/rejuvenator to the proper application temperature if required.
- b. A positive displacement pump capable of pumping low viscosity material and providing a pre-selected constant pressure of 20 to 60 psi (140 to 410 kPa), or provide pre-selected metered flow rates of 3 to 20 gal/min (10 to 75 liters/min) to deliver the specified rates of application.
- c. A full circulation spray bar equipped with proper nozzles, which will provide the specified rates of application.
- d. A hooded spray bar and applicator which maintains constant nozzle height.
- e. A positive shut-off for the spray bar.
- f. A hand spray, with hose, equipped with a positive shutoff at the spray gun.
- g. A thermometer installed in the distributor tank to measure the temperature of the rejuvenator/sealer at the time of application.
- h. A ground speed indicator calibrated in any convenient units such as miles per hour, kilometers per hour, yards per minute, etc. The resolution of the ground speed indicator shall be 2% or less of the nominal ground speed for spraying.
- i. A chart listing the capacity of the tank in gallons (liters) shall be carried in each unit. This chart shall show gallonage (liters) for each 1 inch (2.5 mm) of depth. The chart will show speed/pressure application rates.

629-4.4 CLEANING EXISTING SURFACE. Prior to placing the sealer/rejuvenator, the surface of the pavement shall be clean and free from all vegetation, paint, rubber deposits, oil/fuel spills, debris, dust, dirt or other loose foreign matter to the satisfaction of the Engineer. Cracks which are ¼ inch (6 mm) wide or greater shall be sealed with a compatible joint sealant material.

629-4.5 APPLICATION TEMPERATURE. The temperature of the product during application shall be in accordance with the manufacturer's recommendation.

QUALITY CONTROL

629-5.1 CONTRACTORS CERTIFICATION. Samples of the materials that the Contractor proposes to use, together with a statement as to their source, must be submitted and approved before applying the material.

The Contractor shall furnish the Manufacturer's certification that each consignment of coal-tar rejuvenator/sealer shipped to the project meets the requirements of paragraph 629-2.1.

629-5.2 INSPECTION. The Contractor shall have a manufacturer's representative on the job site at the beginning of operations. The manufacturer's representative shall have knowledge of the materials, procedures, and equipment described in this specification and shall oversee the mixing of the component materials and application of the rejuvenator/sealer. The manufacturer's representative shall have adequate experience in the opinion of the Engineer to advise on the use of coal-tar rejuvenator/sealers. Documentation of this experience shall be furnished to the Engineer prior to the start of operations. The cost of the manufacturer's representative shall be included in the bid price.

629-5.3 FREIGHT AND WEIGH BILLS. The Contractor shall furnish the Engineer with receipted bills when railroad shipments are made, and certified weigh bills when materials are received in any other manner,

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for the coal-tar rejuvenator/sealer used in the construction covered by the contract. The Contractor's representative shall not remove material from the tank car or storage tank until the initial outage and temperature measurements have been verified.

If the Engineer wants to specify a warranty period, the following paragraph shall be included in the specifications.

629-5.4 WARRANTY. The Contractor shall furnish a bonded warrant that the treated pavement shall retain a lower/lowered viscosity for a period of two (2) years from the date of treatment. The proposed rejuvenating product shall furnish proof of the successful two (2) year reduction period for the viscosity requirement. The Engineer/Sponsor will designate an area of no less than 10 square yards (8.4 square meters) of pavement as the control section for all testing. The Contractor shall further warrant that from the date the coal-tar sealer/rejuvenator is applied and for a period of two years thereafter, the material will not flake, peel, chip, or spall, or the Contractor will reapply the coal-tar sealer/rejuvenator as necessary. Finally, the Contractor will warrant the treated surface to be fuel resistant and remain fuel resistant for a period of two years after the date of application.

This warranty shall be effective only if spills are cleaned up as per local regulations.

METHOD OF MEASUREMENT

629-6.1. The quantity of coal-tar rejuvenator sealer to be paid for shall be [the number of square yards (square meters)] performed in accordance with the specifications and accepted by the Engineer.

BASIS OF PAYMENT

629-7.1. Payment shall be made at the contract price [per square yard (square meter)] for pavement [sealing/rejuvenating, fuel resistant sealing]. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

TESTING REQUIREMENTS

629-8.1 Federal Aviation Administration, Advisory Circular 150/5320-12, Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces, Chapter 3, section IV, Conducting Friction Evaluation with CFME.

Field Fuel Resistance Test, Paragraph 629-3.6.

ASTM D 490: Standard Specification for Road Tar.

ASTM D 2171: Standard Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer

ASTM D 2172: Quantitative Extraction of Bitumen from Bituminous Paving Mixtures

ASTM D 3666: Inspection and Testing Agencies for Bituminous Paving Materials

ASTM E 303: Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester